UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

In Re ACACIA MEDIA TECHNOLOGIES CORPORATION	)	Case No. C-05-01114JW **DECLARATION OF STEPHEN M. WALTERS**

Declaration of Stephen M. Walters

Submitted on behalf of Time Warner Cable Inc. and CSC Holdings, Inc.

in Case No. C-05-01114JW

I, Stephen M. Walters, under penalty of perjury, declare as follows:

Introduction and Qualifications

1. I am currently an independent telecommunications consultant. I live and work in Holmdel, New Jersey. I have personal knowledge of the facts stated herein.

2. I received a Bachelor of Electrical Engineering degree from Auburn University in 1974, and M.S. and Ph.D. degrees in Electrical Engineering from Virginia Tech in 1976 and 1977, respectively. While at Virginia Tech I also held a full-time faculty position (Instructor) and taught Electrical Engineering courses to undergraduates. I was elected a member of the Eta Kappa Nu Electrical Engineering Honor Society, the Phi Kappa Phi graduate student honor society and the Sigma Xi scientific research honor society. One of my primary areas of concentration in my graduate studies was communications systems and technologies - including switching systems and transmission systems. For example, for my Master's thesis I developed a novel switching system and transmission system. My Ph.D. research focused on computer science concepts relating to the computational capabilities of specialized computer architectures known as "tessellation automata." This work involved advanced software concepts and mathematics.

3. Prior to receiving my college degrees, I served in the United States Air Force for six years as an Electronics Switching Systems Specialist. In that capacity, I installed transmission systems and switching systems throughout Asia in support of the Vietnam War effort. I was awarded the US Air Force Commendation Medal for meritorious service and was honorably discharged.

4. After receiving my Ph.D. degree in 1977, I went to work for Bell Telephone Laboratories ("Bell Labs") where I helped pioneer the world's first Digital Signal Processor chip

("DSP"). Since Bell Labs was the research and development arm of AT&T, one of the first applications we contemplated for the DSP was to use it in the design of new transmission system technologies (the bread and butter of AT&T was its telephone services, and the transmission systems formed the backbone of the AT&T telephone network). I contributed to the development of a transmission system test system which employed DSPs for detecting transmission impairments.

5. In 1980, I was promoted to lead a group responsible for designing a new transmission system for the 4ESS digital switch. I supervised a group of up to 15 software and firmware developers in this capacity. My group developed and successfully deployed the first 4ESS international digital transmission system.

6. When AT&T was divested in 1984, I joined what was then called Bellcore - the portion of Bell Labs that got divested to work for the local operating companies. The first group I supervised at Bellcore designed the world's first ISDN prototype, including the first prototype ISDN transmission system. This work required a great deal of software development. I personally developed a real-time operating system that was optimized for handling telecommunications protocols.

7. My work on the ISDN transmission system became quite well known, and I presented test results to the CCITT standards body[1] at the organization's 1984 conference in Brazil. Specifically, my presentation demonstrated that the ISDN transmission system specification then being promulgated by the CCITT would operate properly using the physical medium they selected for use with the standard.

[1] The CCITT is now known as the ITU-T standards body.

8. In 1987, I was promoted to manage a department of 40-50 people to develop standards for ATM, a novel type of transmission system, and in 1991 I was one of the founding members of the ATM Forum, and served as its President and Chairman of the Board from 1995-1997. As a result of my efforts in driving the industry's ATM efforts, I was named a "Top Network Technology Driver of the Year" in 1995 by Network Computing magazine, and a "Power Player" by NetworkWorld magazine.

9. In 1993, I was named a Bellcore Fellow, the company's highest distinction, for my industry leadership in ATM. I was also named a Fellow of the IEEE in 1996 for "leadership and technical contributions to ATM commercialization including standards and services." Bellcore, and later Telcordia Technologies (to which Bellcore changed its name in 1997) has repeatedly and publicly recognized me as its "foremost authority on broadband information networking and technology."

10. I am the author of the textbook "The New Telephony: Technology Convergence, Industry Collision." In all, I have been awarded eight United States patents and have two applications pending. In addition, I am the author of *CCDNavigator*, a software application used by astronomers for planning and controlling imaging sessions with telescopes.

11. I have been retained by counsel for Time Warner Cable Inc. to review U.S. Patent Nos. 5,132,992 (the "'992 patent"), 5,253,275 (the "'275 patent"), 5,550,863 (the "'863 patent") and 6,144,702 (the "'702 patent") and their file histories. I have been asked to explain the plain-meanings (if any) of the terms "transmission system" and "reception system," and to compare those plain-meanings to the use of those terms in the '992, '275, '863 and '702 patents. I have also been asked to describe which components of figure 2 correspond to the "compression means" and the "transmitter means" described in column 2 lines 39-14 and column 2 lines 46-48,

respectively, of the ’992 patent. Finally, I have also been asked to describe the concepts of “addressing” and “relative addressing” in computer systems, and to speak to whether or not either of these techniques must utilize “time codes.” Each of the ’992, ’275, ’863 and ’702 patents have the same specification and figures. Therefore, for convenience, all of my citations to the common specification of these patents will be to the column and line numbers of the ’992 patent unless otherwise indicated

12. In addition to the above-identified patents and file histories, I have also reviewed Plaintiff Acacia Media Technologies Corporation’s Memorandum of Points and Authorities in Support of its Motion for Reconsideration of Certain Claim Construction Terms Construed by the Court in its Third Claim Construction Order and its Forth Claim Construction Order and the supporting papers thereto, including the declaration of S. Merrill Weiss dated May 18, 2007. I have also reviewed Mr. Weiss’ declaration dated October 20, 2004, and the literature identified throughout this declaration.

13. For purposes related to the understanding of the terms discussed in this declaration, it is my opinion that one of ordinary skill in the art would have a bachelor of science degree in electrical engineering or computer science (or related technical field) and several years of experience working on information processing and communications systems. Alternatively, such hypothetical person could have an advanced degree and less practical experience. I have not considered what the level of ordinary skill in the art would be for any other purpose (such as the skill that would be required to design or make a system such as that described in the patents.)

14. I understand that the relevant time period for a review of the material is from 1991 to present. I understand that 1991 is the filing date of the first of the applications related to the patents. The following discussion is undertaken from the understanding and point of view of one

of ordinary skill in the art in the 1991 time period. Unless otherwise noted, my opinions would not change if one of ordinary skill in the art was reviewing the information at any time over the period from 1991 to the present.

15. I am being compensated for my time in this matter at the rate of $200/hr. I have never been deposed or testified at trial in an expert capacity. A copy of my CV is attached to this declaration as Appendix A.

"Transmission System"

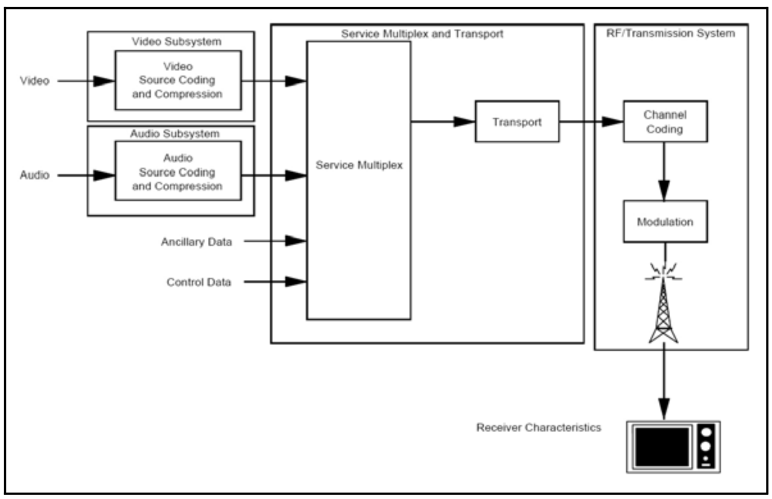
16. The term "transmission system" has a plain and well understood meaning, and refers to the distinct subset of components in information processing and communication systems responsible for moving information from one location to another. "Transmission system" refers to the components that prepare the information for real-time transmission (*i.e.* the information is transmitted immediately after it is prepared for transmission), the components that place information-bearing signals onto a transmission medium, and the physical transmission medium itself. This is confirmed by the extensive literature on the subject of transmission systems. I cite to a few examples below:

> A transmission system in its simplest form is a pair of wires connecting two telephones. More commonly, a transmission system is a complex aggregate of electronic gear and the associated medium, which together provide a multiplicity of channels over which many customers' messages and associated control signals can be transmitted. In general, a call between two points will be handled by connecting a number of different transmission systems in tandem to form an overall transmission connection between two points. Bell Laboratories, *Transmission Systems for Communications* 1 (5th ed. 1982).

> Transmission systems exist to provide circuits for transmitting speech and other signals between the nodes of a telecommunications network . . .Present-day transmission systems range in complexity from simple unamplified audio-frequency lines to satellite radiocommunication systems. J.E. Flood & P. Cochrane, *Transmission Systems* 19 (Peter Peregrinus Ltd. 1991).

transmission system: Part of a communication system organized to accomplish the transfer of information from one point to one or more other points by means of signals.[2]

17. A useful diagram illustrating this plain-meaning definition of "transmission system" appears in the ATSC Digital Television Standard specification, which is the television industry's standard for over-the-air transmission of digital television signals. The system for broadcasting such signals is depicted in the standard as follows:



Advanced Television Systems Committee, *ATSC Digital Television Standard and Amendment No. 1* 18 (1995). Only those components of the system used to format the information specifically for transmission and for placing the signals onto the transmission medium are indicated as being a part of the "transmission system." As this ATSC specification explains at page 19:

[2]Alliance for Telecommunications Industry Solutions, *Telecom Glossary 2000* (2001), http://www.atis.org/tg2k/_transmission_system.html.

> ‘RF/Transmission’ refers to channel coding and modulation. The channel coder takes the data bit stream and adds additional information that can be used by the receiver to reconstruct the data from the received signal which, due to transmission impairments, may not accurately represent the transmitted signal. The modulation (or physical layer) uses the digital data stream information to modulate the transmitted signal.

18. The term “transmission system” had this same plain meaning in 1991 as it has today.

19. The definition of “transmission system” from the IEEE dictionary relied on by Acacia, “an assembly of elements capable of functioning together to transmit signal waves,” confirms this plain meaning. By defining “transmission system” as “an assembly of elements capable of functioning together to **transmit** signal waves, ” and the word “transmit” to mean “[t]o move data from one location to another location,” the IEEE dictionary definition makes clear that “transmission system” constitutes only those elements which transmit or move the information.

20. An alternative definition of “transmission system” in the same IEEE dictionary also limits the term as described above: “[t]he interface and transmission medium through which peer physical layer entities transfer bits.”

21. The use of the term “transmission system” in the specification of the ’992, ’275, ’863 and ’702 patents is not consistent with this plain meaning. Pursuant to the plain meaning, the only components of figure 2 of the specification that would be part of a “transmission system” are “transmission format conversion CPU” 119, “transceiver” 122 and the various types of media represented by the designations “ISDN,” “B ISDN,” “Satellite” etc. in figure 2b. These components satisfy the plain meaning of “transmission system” because the “transmission format

conversion CPU" 119 prepares the signals specifically for transmission in real time,[3] the transmitter places the signals onto the medium, and the terms "ISDN, Satellite" etc. are used to refer to the medium itself.

22. As used in the specification of the '992, '275, '863 and '702 patents, however, the term "transmission system" includes components and functionality excluded by the plain-meaning of "transmission system." In particular, "transmission system" in the patents is used to refer to the system depicted in figures 2a and 2b. This "transmission system" includes two storage libraries - a "source material library" for physical items containing information (such as books, still pictures, computer tapes and musical instruments) (column 5 line 66 - column 6 line 34) and a "compressed data library" for information in compressed form (column 10 lines 31-57.) Storage libraries are antithetical to the functions and objectives of plain-meaning transmission systems because transmission systems are designed to move information, not to store and maintain it.

23. The specification, including figures 2a and 2b, also includes an "identification encoder" as part of the "transmission system." This "identification encoder," as it is described in the specification, is also incompatible with the plain meaning of "transmission system." According to the specification, an identification encoder performs "storage encoding," which includes assigning unique identification codes and file addresses where information will be

---

[3]According to the specification, the "transmission format conversion CPU" 119 also "receives the [user] request and retrieves the composite formatted data block of the requested item stored in compressed data library 118 . . . ." (column 13 lines 40-43.) The portion of element 119 which performs this function is not part of a plain-meaning transmission system. As described in ¶ 25 below, plain-meaning transmission systems do not receive and process user requests.

stored in the compressed data library. (column 6 lines 35-54.) Such codes and addresses have no role in transmission.

24. Because storage libraries perform the exact opposite function of moving information, and because the source material library, the compressed data library and the identification encoder all relate to saving and retrieving information to/from storage libraries, all three of these components of the patented "transmission system" are incompatible with the plain meaning of "transmission system."

25. Other functions performed by the disclosed "transmission system" are also incompatible with the plain meaning of that term. For example, the disclosed "transmission system" receives and processes user requests: "the first step of the distribution method 400 involves retrieving the information for selected items in the source material library 111, upon a request by a user..." (column 18 lines 53-56.) However, "transmission systems," according to the plain meaning of that term, are not involved in determining what information is to be transmitted. The only function of the transmission system is to move information provided to it from one place to another.

26. I have also been asked to review claim 41 of the '992 patent and claim 14 of the '863 patent (both of which are attached hereto as Appendix B) and to determine if the steps they require be performed either by a "transmission system" or as part of a "transmitting step" are capable of being performed by plain-meaning transmission systems. Many of these steps cannot be performed by plain-meaning transmission systems, including the following: "storing items having information in a source material library" ('992 Patent, claim 41); "inputting an item having information into a transmission system" ('863 Patent, claim 14); "retrieving the information in the items from the source material library" ('992 Patent, claim 41); "assigning a

unique identification code to the retrieved information" ('992 Patent, claim 41); "assigning a unique identification code to the item having information" ('863 Patent claim 14); "placing the formatted data into a sequence of addressable data blocks" ('992 Patent, claim 41); "formatting the item having information as a sequence of addressable data blocks" ('863 Patent, claim 14); "storing, as a file, the compressed, formatted, and sequenced data blocks with the assigned unique identification code." ('992 Patent, claim 41; '863 Patent, claim 14.)

27. If the IEEE dictionary definition of "transmission system" did cover all equipment that is connected directly or indirectly to transmitting equipment, the term would have no useful meaning. All computers, information processing devices and storage devices directly or indirectly connected to a network would be part of the same single transmission system. In fact, all information processing devices and storage devices on the planet which are directly or indirectly connected to any public network (such as the Internet, the telephone network etc), as well as all of these networks themselves, would make up a single transmission system since information can be transmitted from any device to any other device. One consequence of this is that there would be no way to distinguish a "transmission system" from a "receiving system," as all of the components on any network would be part of the "transmission system."

28. In view of all of the above facts, those of ordinary skill in the art would understand that the term "transmission system" as used in the specification of the '992, '275, '863 and '702 patents means the system which is depicted in figures 2a and 2b, and does not refer to the plain meaning of "transmission system."

"Receiving System"

29. Unlike the term "transmission system," the term "receiving system" does not have a single plain meaning. Those of ordinary skill in the art would understand that its meaning has

to be determined by the context in which it is used. When used in conjunction with plain meaning "transmission system," however, those of ordinary skill in the art would understand "receiving system" to refer to the specific components which receive the information-bearing signal from the physical medium and undo the processing for transmission performed by the transmission system. In figure 6, then, that would comprise only transceiver 201 and "receiver format converter" 202.

30. In the specification, however, the term "receiving system" is used to refer to the entire system shown in figure 6. Therefore, since the only contextually appropriate plain meaning for the term "transmission system" is incompatible with the use of "receiving system" in the specification, those of ordinary skill in the art would understand that the patentees gave the term a special meaning, and would read the term "receiving system" as used in the patents as meaning the specific, entire system depicted in figure 6.

"Compression Means" and "Transmitter Means"

31. I have been asked to identify which components of figures 2a and 2b those of ordinary skill in the art would understand to correspond to the "compression means" described at column 2 lines 39-41, and to the "transmitter means" described at column 2 lines 46-48. I have been asked to assume that the "compression means" are the components of figure 2 that perform compression, and that the "transmitter means" are the components that perform transmission.

32. Those of ordinary skill in the art would understand the "compression means" to include "precompression data processing" device 115 and "compressor" 116. Data is formatted for compression by precompressor processor 115 and then compressed by compressor 116. (column 7 line 59 - column 8 line 6.) Both are required for compression, as the specification makes very clear: "Video precompression processor 115b buffers incoming video data and

converts the aspect ratio and frame rate of the data, *as required by compression processor* 116." (column 8 line 67 - column 9 line 2.) The specification also repeatedly describes precompression processing as part of compression. (column 7 lines 46-47) ("compression by precompression processor 115 and compressors 128 and 129"); (column 8 lines 5-6) ("compression processing by precompression processor 115 and compressor 116").

33. Finally, the specification explicitly describes the precompression processor as part of the "compression means":

> The transmission system 100 of the present invention also preferably includes data compression means for compressing the formatted and sequenced data. The sequence of addressable data blocks which was time encoded and output by the time encoder 114 is preferably sent to precompression processor 115.

(column 8 lines 57-62.)

34. For all of these reasons, as well as for the simple overarching reason that the sole functions of components 115 and 116 are to work in tandem to compress the data to reduce the library capacity storage requirements, those of ordinary skill in the art would understand the "compression means" to include both "precompression data processing" device 115 and "compressor" 116.

35. Similarly, those of ordinary skill in the art would understand that both the "transmission format conversion CPU" 119 in figure 2b (which "converts the compressed formatted data block into a format suitable for transmission" - column 13 lines 40-45) and the transceiver/transmitter 122 make up the "transmitter means." The two work in tandem to transmit the data. In addition, the disclosed "transmission system" would not work without the "transmission format conversion CPU." According to the specification, this is the element that

retrieves the information from the compressed data library after the user requests it. (column 13 lines 40-45.)

36. Finally, I have been asked if it is possible that the "compression means" includes only "compressor" 116, that the "transmitter means" includes only "transceiver/transmitter" 122, and that those of ordinary skill in the art would deem the description of the "transmission system" at column 2 lines 25-48 to be an alternative embodiment to the embodiment depicted in figure 2. For all of the reasons described above, that is not the way those of ordinary skill in the art would read the specification. Moreover, without the "pre compression data processing" unit 115 and the "transmission format conversion CPU" 119, the disclosed "transmission system" would not work. Those of ordinary skill in the art would not read a technical specification in such a way that it describes two embodiments, one of which is inoperative, if there is a reasonable way to read the specification such that it describes the same operative embodiment. An inoperative embodiment is not an alternative embodiment.

"Addresses" and "Relative Addresses"

37. The concepts of "addressing" and "relative addressing" are well known to those of ordinary skill in the art. The "address" of a data unit is the starting location of the data in a storage device. The "relative address" of a data unit is not the starting storage location of the data unit itself, but rather the address of the data unit relative to the known starting location of the file of which the data unit is a part. A "relative address" is sometimes called an "offset address," because the relative address is expressed as an offset value from the known starting location of the file.

38. The definitions of "address" and "relative address" from the Microsoft Dictionary, *Computer Dictionary* (2d ed., Microsoft Press 1994), accurately describe these concepts:

address *As a noun*, the value that represents an individually accessible storage location. In a typical computer, each memory location has a separate address. The addresses for the memory system are numbered 0, 1, 2, and so on, up to the maximum possible number of locations supported . . .

As a verb, to reference a storage location.

Microsoft Dictionary p. 12.

relative address . . . A location, as in a computer's memory, that is calculated in terms of its distance (displacement) from a starting point (base address). A relative address is typically computed by adding an offset to the base - in everyday terms, this is similar to creating the address 2001 Main Street, in which the base is the 2000 block of Main Street and the offset is 1, which specifies the first house from the beginning of the block.

Microsoft Dictionary p. 336.

39. "Addressing" and "relative addressing" had the same meaning in 1991 as they have today.

40. I have been asked whether "time codes" must be used to address data. The answer is that neither the concepts of "addressing" nor "relative addressing" are limited to the use of time codes. Many ways of "addressing" and "relative addressing" other than using time codes are well known. For example, "relative addressing" can be achieved by using simple sequential numbering of data blocks from 1 to N in conjunction with the storage location of the start of the file. Those of ordinary skill in the art would not understand the concepts of addressing or relative addressing to be limited to the use of time codes.

I declare under penalty of perjury that the foregoing statements are true and correct.

Dated: 17 July 2007

By: Stephen M. Walters

Stephen M. Walters

Appendix A

Dr. Stephen M. Walters

21 Winthrop Dr.
Holmdel, N.J. 07734
(732) 241-6069
swalters@ieee.org

EDUCATION

Ph.D. (Electrical Engineering)
December 1977
Virginia Polytechnic Institute and State University
Blacksburg, Va.

M.S. (Electrical Engineering)
June 1976
Virginia Polytechnic Institute and State University
Blacksburg, Va.

B.E.E. (Electrical Engineering)
August 1974
Auburn University
Auburn, Ala.

Electronics Engineering Diploma
September 1973
Cleveland Institute of Electronics
Cleveland, Ohio

Telephone Switching Equipment Repair/Installation
Sep 1968
U.S.A.F. Technical School
Sheppard AFB, Texas

HONORS

IEEE Fellow (for “leadership and technical contributions to ATM commercialization including standards and services”)

Bellcore Fellow (for industory leadership in ATM)

Eta Kappa Nu Electrical Enginnering Honor Society

Phi Kappa Phi Graduate Student Honor Society

Sigma Xi Scientific Research Honor Society

EMPLOYMENT HISTORY

Position: Independent Consultant
Date: Sep 2002 - Present
Clients: Telcordia, NTT, SAIC, others
Duties: Chief architect for Telcordia VoIP carrier grade notification service; architect for Telcordia VoIP Routing Registry system; consulted on SONET undersea system with SAIC; helped NTT (Japan) prepare a strategic plan for their future.

Position: Principal & Fellow
Date: Jan 1997 – Sep 2002
Employer: Telcordia, Red Bank, NJ
Duties: Conceived and defined new architectural directions for Bellcore, including IP networking architectures. Primary rainmaker for Engineering business unit. Landed $3.5M in contracted work from $4.2M offered.

Position: General Manager - Broadband Business Development
Date: Sep 1995 - Jan 1997
Employer: Bellcore, Red Bank, NJ
Duties: Responsible for attracting new customers to Bellcore's consulting area. Developed new services for sale to customers and established Bellcore as a leading supplier of professional services. Developed three services in consulting role to customers which were actually brought to market. I was responsible for a $50M revenue stream to Bellcore.

Position: General Manager - Broadband Product Line Manager
Date: Jun 1993 - Sep 1995
Employer: Bellcore, Red Bank, NJ
Duties: Responsible for definition and content of all Bellcore products and services relating to broadband for both business and residential users. These included SONET, ATM, SMDS, Frame Relay, Cell Relay, Fiber to the Curb/Home, Internet/IP and the BroadNet software product family of network management systems. This product line represented an annual revenue of $90M in 1995, up from $65M in 1994, and was a blend of consulting, engineering, deployment support and software products mostly directed towards RBOCs. Aided by my staff of 43 product managers and business planners, I defined products and services, created and analyzed business cases for profitabiliy, planned and initiated alliances and investments ($30M for 1995), supported sales initiatives and operated the broadband business unit which included oversight of all developments.

Position: Division Manager - Advanced Network Technology, Technology Systems
Date: Aug 1987 - Jun 1993
Employer: Bell Communications Research; Red Bank, N.J.
Duties: Supervision of 4 districts (25 MTS) working in advanced technology for network applications. Particular project responsibilities included managing the technical direction and budgets for Next Generation Switching (NGS) and Broadband ISDN (BISDN). In NGS, new software to achieve Advanced Intelligent Network within a local exchange was studied. For BISDN, work on Asynchronous Transfer Mode (ATM) for IEEE, T1S1 and CCITT standards was done. This organization set the Bellcore direction in future switching system concepts and was the primary influence in the North American standards position.

Position: District Manager - Communications Processing, Applied Research
Date: Sep 1983 - Aug 1987
Employer: Bell Communications Research; Red Bank, N.J.

Duties: Supervision of 5 researchers working in the area of data and voice telecommunications, particularly the ISDN. Activities included ISDN Technology Transfer Package (TTP) and distributed (multicomputer) exchange processing focusing on software, hardware and system architectures for access protocols and call management. The TTP was provided to 35 organizations within Bellcore and 11 vendors who incorporated it in early ISDN systems for trials. It fully implemented Q.931, LAPD and I.430 protocol for both TE and exchange equipment. Besides determining the technical direction, I implemented the Q.931 and LAPD software and the real-time operating system optimized for processing telecom protocols. I also originated and implemented Adaptive Rate Multiplexing, a novel an highly flexible technique for multiplexing variable rate bit streams into a single line. Four patents were granted on this work.

Position: Group Supervisor - Software and Exploratory Studies
Date: Oct 1980 - Sep 1983
Employer: Bell Telephone Laboratories, Holmdel, N.J.
Duties: Supervision of up to 13 technical staff responsible for all software and firmware for digital facility terminals including bit compression multiplexors. The designers programed in several languages including microcode for bit slice elements, diagnostic languages, assembler and C for microprocessors. Programming was of a real-time nature and ran under our own operating system within the microprocessors. My group was also responsible for programming the CCITT 32 Kb ADPCM/DLQ algorithm for the bit compressors and participated in its development. I received two patents on this work. I was responsible for technical leadership and administration of this group and co-ordinated the work of several projects. I was also responsible for defining new projects for the department. In both these roles, I traveled widely and interacted frequently with supervision at several locations including Western Electric Company managers. Specific projects developed include DIF-E1, a large (>1Mb) digital facility terminal for 4ESS; BICOM, a controllable variable rate bit compression terminal; BCM/PL, a low cost non-controllable fixed rate bit compressor; and SAGE, a DACS controller for private network management, which I originated and developed.

Position: Member of Technical Staff - DSP group
Date: Dec 1977 - Oct 1980
Employer: Bell Telephone Laboratories; Holmdel, N.J.
Duties: Design of Digital Signal Processor and associated development system. This included development of a programming language and a simulator of the processor. Primary responsibilities included processor architecture definition (3 other MTS involved) and hardware design of the input/output processing unit for DSP. A patent was granted for this work. I was Principal engineer for the DSP Development system (DSPMATE) and was responsible for overall specification and detailed software design. This included hardware design and debugging as well as system integration.

Position: Instructor
Date: Sep 1976 - Sep 1977
Employer: Virginia Tech E.E. Dept.; Blacksburg, Va.
Duties: Full time teaching of college level lecture courses, primarily in the areas of electronics, active filters, networks and computers. Typically four courses totaling 130 students per quarter was taught.

Position: Graduate Teaching/Research Assistant
Date: Sep 1974 - Sep 1976, Sep 1977 - Dec 1977
Employer: Virginia Tech E.E. Dept.; Blacksburg, Va.
Duties: Part time teaching of college lecture courses and laboratories. Also supported by National Science Foundation grant for research in cellular computer systems.

Position: Engineering Assistant
Date: April 1974 - Sep 1974

Employer: Auburn University E.E. Department; Auburn, Ala.
Duties: Assisted in maintaining a PDP 11/40 minicomputer and other E.E. department laboratory equipment. Performed printed circuit board layout and fabrication. Designed and constructed various laboratory apparatus.

Position: Staff Sargent
Date: Dec 1967 - Mar 1973
Employer: United States Air Force; Worldwide
Duties: Supervised teams of 5 to 10 men in installation and maintenance of strowger, X-Y and crossbar telephone central office equipment. Received an honorable discharge and the Air Force Commendation Medal. Vietnam Veteran.

TEXTBOOKS

The New Telephony: Technology Convergence, Industry Collision, Prentice Hall (2002)

INVITED TALKS AND LECTURES

A Conversation with Steve Walters
ATM Year 96, San Francisco, CA, May 6, 1996.

The Way Forward with ATM
Australian Telecom User's Group (ATUG) conference, Melbourne, Australia, April 30, 1996.

ATM Olympics
Exploiting ATM, A Canadian Institute Conference, March 25, 1996.

ATM Olympics
ATM '96 Conference, Orlando, FL, February 22, 1996.

ATM Olympics
Next Generation Networks Conference, Washington, DC, November, 1995.

ATM Directions
BISDN Workshop, Melbourne Australia, October, 1995.

PUBLICATIONS

Evolution of Fiber Access Systems to ATM Broadband Networking (Invited paper)
S. M. Walters, G. H. Dobrowski and D. Burpee
Proceedings of the IEEE, November 1993.

Asynchronous Transfer Mode (Invited paper)
S. M. Walters
Proceedings of Computing in High Energy Physics Conference, September, 1992.

Broadband-ISDN Network Infrastructure Services and Applications
S. M. Walters
Committee T1 Standards Seminar for Government, September, 1992.

ATM and Multimedia
S. M. Walters
Proceedings of Public Data Networks Conference, June 1992.

ATM Cell Relay versus Frame Relay
S. M. Walters
Proceedings of ComNet Conference, July 1992.

Evolution and Introductory Scenarios for Broadband ISDN (Invited paper)
S. M. Walters
Proceedings of IEEE B-ISDN Workshop, March 1991.

Broadband Virtual Private Networks and their Evolution
S. M. Walters and M. Ahmed
Proceedings of the International Switching Symposium, October, 1992.

A New Direction for Broadband ISDN
S. M. Walters
IEEE Communications Magazine, September 1991.

Neural Networks for Switch Control
S. M. Walters and T. P. Troudet
IEEE Transactions on Circuits and Systems, June 1990.

Implications of BISDN Services on Network Architecture and Switching
S. M. Walters et al
Proceedings of International Switching Symposium, May 1990.

Directions of B-ISDN
S. M. Walters
Proceedings of ISDN '89 Conference, September, 1989.

Digital Phase-Locked Loop with Bounded Jitter
S. M. Walters and T. P. Troudet
IEEE Transactions on Circuits and Systems, July 1989.

User Access for Broadband ISDN: Full ATM or Otherwise
S. M. Walters
Proceedings of InfoCom Conference, April 1989.

Next Generation Switching
S. M. Walters
Proceedings of the National Communications Forum, October 1988.

Voice Impairment and Its Relationship to Cell Size
S. M. Walters
ATM Workshop Proceedings, June 1988.

Next Generation Switching
S. M. Walters
Digest Magazine, February, 1988.

Packet versus Circuit Switching
S. M. Walters
INFOCON Proceedings, March 1988.

Hopfield Neural Net Architecture for Switch Control
S. M. Walters and T. P. Troudet
IEEE International Conference on Neural Networks, San Diego, July 1988.

A Working Research Prototype of an ISDN Central Office
H. S. Liu, E. P. Thomas, and S. M. Walters
IEEE Journal on Selected Areas in Communications, November 1986.

A Microprocessor-Based Design with Real-Time Multi-tasking for the ISDN
D. P. Jiang and S. M. Walters
Symposium of Microprocessor Applications, New York, December 1984.

ISDN NT/TE Laboratory Test Results
S. M. Walters and E. P. Thomas
CCITT Contribution for Brasilia, February 1984.

Self-Diagnosing Cellular Implementations of Finite-State Machines
S. M. Walters, F. G. Gray and R. A. Thompson
IEEE Transactions on Computers, December 1981.

Digital Signal Processor: Architecture and Performance
J. R. Boddie, G. T. Daryanani, I. Eldumiati, R. N. Gadenz, J. S. Thompson and S. M. Walters
Bell System Technical Journal (special edition), September 1981.

A Digital Signal Processor for Telecommunications Applications
J. R. Boddie, G. T. Daryanani, I. Eldumiati, R. N. Gadenz, J. S. Thompson and S. M. Walters
International Solid State Circuits Conference, 1980.

An Integrated Circuit Digital Signal Processor
S. M. Walters et al
International Conference on Communications (ICC'80), 1980.

Stability in a Class of Tessellation Automata
R. A. Thompson, S. M. Walters and F. G. Gray
Proceedings of the Ninth Annual Southeastern Symposium on System Theory, 1977.

A Cellular Switching Network
S. M. Walters and R. A. Thompson
Proceedings of the Ninth Annual Southeastern Symposium on System Theory, 1977.

Pattern Restoration in Tessellation Automata
S. M. Walters, R. A. Thompson and F. G. Gray
Proceedings of Southeastcon, 1977.

Pattern Synthesis in One-Dimensional Tessellation Automata
S. M. Walters, R. A. Thompson and F. G. Gray
Proceedings of the Eighth Annual Southeastern Symposium on
System Theory, 1976.

BELLCORE MEMORANDA

Hopfield Neural Network Architecture for Switch Control
S. M. Walters and T. P. Troudet
Bellcore Applied Research Technical Memorandum, March 1988.
TM-ARH-011404

Hopfield Neural Network Architecture for Switch Control
S. M. Walters and T. P. Troudet
Bellcore Applied Research Technical Memorandum, February 1988.

TM-ARH-011039

Design of a Digital Phase Locked Loop with Bounded Jitter
S. M. Walters and T. P. Troudet
Bellcore Applied Research Technical Memorandum, July 1987.
TM-ARH-009810

Design of a Digital Phase Locked Loop with Controlled Jitter
S. M. Walters and T. P. Troudet
Bellcore Applied Research Technical Memorandum, February 1987.
TM-ARH-008748

Low Jitter Digital Phase-Locked Loop Synthesizer with Frequency/Phase Window Comparator.
S. M. Walters and T. P. Troudet
Bellcore Applied Research Technical Note, October 1986.

ISDN CPE Testbed Implementation
S. M. Walters et al
Bellcore Applied Research Technical Memorandum, October 1985.
TM-NPL-001769

A Working Research Prototype of an ISDN Central Office
S. M. Walters, H. S. Liu and E. P. Thomas
Bellcore Applied Research Technical Memorandum, July 1985.
TM-ARH-001166

A Cyclic Time Sharing Kernel
S. M. Walters and H. S. Liu
Bellcore Applied Research Technical Memorandum, July 1985.

ISDN Prototype System Layer 3 Functional Description
S. M. Walters and H. S. Liu
Bellcore Applied Research Technical Memorandum, July 1985.

A Shared Data Link Layer Architecture for ISDN
S. M. Walters and H. S. Liu
Bellcore Applied Research Technical Memorandum, July 1985.

Applications of Adaptive Rate Multiplexing
S. M. Walters
Bellcore Applied Research Technical Memorandum, February 1985.
TM-ARH-000918

Adaptive Rate Multiplexing
S. M. Walters
Bellcore Applied Research Technical Memorandum, January 1985.
TM-ARH-000842

Implementation of a Data and Signaling Multiplexer
S. M. Walters and K. A. Lindsay
Bellcore Applied Research Technical Memorandum, December 1984.
TM-ARH-000339

Multidimsional Good Sequences
S. M. Walters
Bellcore Applied Research Technical Memorandum, November 1984.

TM-ARH-000411

Simultaneous Transport of Voice and Data by Bit-Robbing
S. M. Walters
Bellcore Applied Research Technical Memorandum, May 1984.
TM-304-21334-84-02

NT/TE Test Results for ISDN
S. M. Walters and E. P. Thomas
CCITT Contribution ZM (Brasilia), February 1984.

BELL LABS MEMORANDA

DSP Interfacing Manual
S. M. Walters
Bell Laboratories Technical Memorandum, Sep 1980.

Special DSP Addressing Mode
S. M. Walters
Bell Laboratories Technical Memorandum, June 1980.

In-Circuit Emulation with DSPMATE
S. M. Walters
Bell Laboratories Technical Memorandum, May 1980.

DSPMATE User's Manual
S. M. Walters
Bell Laboratories Technical Memorandum, Apr 1980.

DSPMATE Technical Specification
S. M. Walters
Bell Laboratories Technical Memorandum, Apr 1980.

Interfacing the HP1610A Logic Analyzer to a DSP Emulator
S. M. Walters
Bell Laboratories Technical Memorandum, Aug 1979.

I/O Description for an Integrated Digital Signal Processor
S. M. Walters
Bell Laboratories Technical Memorandum, Jan 1979.

A High Bandwidth Synchronous Bus Multiprocessor
L. N. Evenchik and S. M. Walters
Bell Laboratories Technical Memorandum, Nov 1978.

8086 Single Card Microcomputer
J. S. Lowell and S. M. Walters
Bell Laboratories Technical Memorandum, Oct 1978.

PATENTS

Broadband Virtual Private Networks, #5,432,785
S. M. Walters and M. Ahmed
September 1, 1995.

Digital Phase Locked Loop with Bounded Jitter, #4,855,683
T. P. Troudet and S. M. Walters
August 8, 1989.

Optimal Frame Arrangement for Multiplexing a Plurality of Subchannels Onto a Fixed Rate Channel, #4,752,923
D. L. Allen and S. M. Walters
June 21, 1988.

Adaptive Rate Multiplexer-Demultiplexer, #4,658,152
S. M. Walters
April 14, 1987.

Frame Arrangement for Multiplexing a Plurality of Subchannels onto A Fixed Rate Channel, #4,617,658.
S. M. Walters
October 14, 1986.

Bit Compression Multiplexing, #4,519,073
G. Bertocci and S. M. Walters
May 21, 1985.

Bit Compression Coding with Embedded Signaling, #4,516,241
R. L. Farah and S. M. Walters
May 7, 1985.

A Data Control Circuit, #4,408,272
S. M. Walters
Oct. 4, 1983.

Appendix B

storing a list of items available to the user from at least one compressed data library; and

providing the user with the list so that the user may remotely select a particular item for transmission.

23. The distribution method as recited in claim **19**, wherein the step of storing includes the step of storing the received information at the head end of a cable television reception system.

24. The distribution method as recited in claim **19**, wherein the step of storing includes the step of storing the received information in an intermediate storage device.

25. A receiving system responsive to a user input identifying a choice of an item stored in a source material library at a transmission system to be played back to a user at a location remote from the source material library, the item containing information to be sent from the transmission system to the receiving system, the receiving system comprising:

requesting means for transmitting to the source material library in the transmission system the identity of the item;

transceiver means, coupled to the requesting means, for receiving the item from the transmission system as at least one compressed, formatted data block;

receiver format conversion means, coupled to the transceiver means, for converting the at least one compressed, formatted data block into a format suitable for storage processing, and for playback at the receiver system;

storage means, coupled to the receiver format conversion means, for storing a complete copy of the formatted data;

decompressing means, coupled to the storage means, for decompressing the copy of the formatted data; and

output data conversion means, coupled to the decompressing means, for playing back the decompressed copy of the data at a time specified by the user.

26. A receiving system as recited in claim **25**, further comprising:

user interface means for translating the input into a request for sending the requested information from the transmitter to the receiving system.

27. A receiving system as recited in claim **25**, wherein the output data conversion means includes recording means which controls the playback of the copy.

28. A receiving system as recited in claim **25**, wherein the storage means stores the formatted information until playback is requested by an operator.

29. A receiving system as recited in claim **25**, wherein the formatted data includes video information, and wherein the decompressing means further comprises:

video signal decompressing means for decompressing the video information contained in the formatted data.

30. A receiving system as recited in claim **29**, wherein the output data conversion means further comprises:

digital video output means, connected to the video signal decompressing means, for outputting a digital video signal; and

analog video output means, connected to the video signal decompressing means, for outputting an analog video signal.

31. A receiving system as recited in claim **30**, wherein the video output means further comprises:

copy protection means for preventing copying by the user of protected information.

32. A receiving system as recited in claim **25**, wherein the formatted data includes audio information, and wherein the decompressing means further comprises:

audio signal decompressing means for decompressing the audio information contained in the formatted data.

33. A receiving system as recited in claim **32**, wherein the output data conversion means further comprises:

digital audio output means, connected to the audio signal decompressing means, for outputting a digital audio signal; and

analog audio output means, connected to the audio signal decompressing means, for outputting an analog audio signal.

34. A receiving system as recited in claim **25**, wherein the formatted data includes audio and video information, and wherein the decompressing means further comprises:

video signal decompressing means for decompressing the video information contained in the formatted data; and

audio signal decompressing means for decompressing the audio information contained in the formatted data.

35. A receiving system as recited in claim **25**, wherein the transceiver means receives the information via any one of telephone, ISDN, broadband ISDN, satellite, common carrier, computer channels, cable television systems, MAN, and microwave.

36. A receiving system as recited in claim **25**, wherein the source material library is a compressed data library.

37. A receiving system as recited in claim **29**, wherein the output data conversion means further comprises digital video output means, connected to the video signal decompressing means, for outputting a digital video signal.

38. A receiving system as recited in claim **29**, wherein the output data conversion means further comprises analog video output means, connected to the video signal decompressing means, for outputting an analog video signal.

39. A receiving system as recited in claim **32**, wherein the output data conversion means further comprises digital audio output means, connected to the audio signal decompressing means, for outputting a digital audio signal.

40. A receiving system as recited in claim **32**, wherein the output data conversion means further comprises analog audio output means, connected to the audio signal decompressing means, for outputting an analog audio signal.

41. A method of transmitting information to remote locations, the transmission method comprising the steps, performed by a transmission system, of:

storing items having information in a source material library;

retrieving the information in the items from the source material library;

assigning a unique identification code to the retrieved information;

placing the retrieved information into a predetermined format as formatted data;

placing the formatted data into a sequence of addressable data blocks;

compressing the formatted and sequenced data blocks;

storing, as a file, the compressed, formatted, and sequenced data blocks with the assigned unique identification code; and

sending at least a portion of the file to one of the remote locations.

42. A transmission method as recited in claim **41**, wherein the step of placing further includes the steps of:

A/D converting analog signals of the retrieved information into a series of digital data bytes; and

converting the series of digital data bytes into formatted data with a predetermined format.

43. A transmission method as recited in claim **41**, wherein the step of placing further includes the steps of:

converting digital signals of the retrieved information into predetermined voltage levels; and

converting the predetermined voltage levels into formatted data with a predetermined format.

44. A transmission method as recited in claim **41**, wherein the step of placing further includes the step of converting digital signals of the retrieved information into formatted data with a predetermined format.

45. A transmission method as recited in claim **41**, wherein the storing step further comprises the step of:

separately storing a plurality of files, each including compressed, sequenced data blocks.

46. A transmission method as recited in claim **45**, further comprising the steps, performed by the transmission system, of:

generating a listing of available items;

receiving transmission requests to transmit available items; and

retrieving stored formatted data blocks corresponding to requests from users.

47. A distribution system including a transmission system and a plurality of receiving systems at remote locations, the transmission system being responsive to requests identifying items containing information to be sent from the transmission system to the receiving systems at the remote locations, the distribution system comprising:

storage means in the transmission system for storing information from the items in a compressed data form, in which the information includes an identification code and is placed into ordered data blocks;

requesting means in the transmission system, coupled to the storage means, for receiving requests from a user for at least a part of the stored information to be transmitted to the receiving system at one of the remote locations selected by the user;

transmission means in the transmission system, coupled to the requesting means, for sending at least a portion of the stored information to the receiving system at the selected remote location;

receiving means in the receiving system for receiving the transmitted information;

memory means in the receiving system, coupled to the receiving means, for storing a complete copy the received information; and

playback means in the receiving system, coupled to the memory means, for playing back the stored copy of the received information at a time requested by the user.

48. A distribution system as recited in claim **47**, wherein the information in the items includes analog and digital signals, and wherein the storage means further comprises:

conversion means, for converting the analog signals of the information to digital components;

formatting means, coupled to the conversion means, for formatting the digital signals of the information;

ordering means, coupled to the formatting means, for ordering the converted analog signals and the formatted digital signals into a sequence of addressable data blocks and;

compression means, coupled to the ordering means, for compressing the ordered information.

49. A distribution system as recited in claim **47**, wherein the memory means includes means for receiving information at the head end of a cable television reception system.

50. A distribution system as recited in claim **49**, wherein the head end of the cable television reception system includes means for decompressing the received signals and distributing the decompressed received signals.

51. A distribution system as recited in claim **49**, wherein the head end of the cable television reception system includes means for distributing compressed signals.

52. A distribution system as recited in claim **49**, wherein the head end of the cable television reception system includes means for decompressing the received signals and for distributing the decompressed received signals and compressed received signals.

53. A distribution system as recited in claim **47**, wherein the memory means is an intermediate storage device.

54. A method of receiving information at a receiving system from a transmission system which information is responsive to an input from a user, the input identifying a choice of an item stored in a source material library to be played back to the user at a receiving system at a location remote from the source material library, the item containing information to be sent from the transmission system to the receiving system, the receiving method comprising the steps of:

transmitting the identity of an item from the user to the source material library at the transmission system;

receiving at the receiving system the item from the transmission system as at least one compressed formatted data block;

converting, at the receiving system, the at least one compressed formatted data into a format suitable for storage processing and for playback in real time;

storing the converted information at the receiving system;

decompressing the stored information at the receiving system; and

playing back, at the receiving system, the decompressed information at a time specified by the user.

55. A receiving method, as recited in claim **54**, wherein the decompressing step further includes the step of decompressing video information contained in the stored information.

56. A receiving method as recited in claim **54**, wherein the decompressing step further includes the step of decompressing audio information contained in the stored information.

57. A receiving method as recited in claim **54**, wherein the decompressing step further includes the steps of:

decompressing video information contained in the stored information; and

decompressing audio information contained in the stored information.

58. a receiving method as recited in claim **54**, wherein the step of transmitting further includes the step of transmitting to a compressed data library the identity of an item.

* * * * *

compression means, coupled to the ordering means, for compressing the formatted and sequenced data blocks;

compressed data storing means, coupled to the data compression means, for storing as files the compressed, sequenced data blocks; and

first transmitter means, coupled to the compressed data storing means, for selectively sending at least a portion of one of the files;

a distribution system, remote from the transmission system, the distribution system comprising:

means for receiving and storing a complete copy of the portion of one of the files sent by the first transmitter means; and

second transmitter means, responsive to the stored portion of the one of the files, for transmitting a representation of the stored portion to at least one of a plurality of the remote locations.

11. A transmission system as recited in claim **10**, wherein;

the first transmitter means transmits the portion of the one of the files at a non-real time rate; and the second transmitter means transmits the stored portion in substantially real time.

12. A transmission system as recited in claim **11**, wherein the second transmitter means comprises a decompressor for decompressing the complete copy of the stored portion of the one of the files.

13. A transmission system as in claim **10**, further comprising library means for storing and supplying to the identification encoding means items containing information.

14. A method of distributing audio/video information comprising:

transmitting compressed, digitized data representing a complete copy of at least one item of audio/video information at a non-real time rate from a central processing location;

receiving the transmitted compressed, digitized data representing a complete copy of the at least one item of audio/video information, at a local distribution system remote from the central processing location;

storing the received compressed digitized data representing the complete copy of the at least one item at the local distribution system;

in response to the stored compressed, digitized data, transmitting a representation of the at least one item at a real-time rate to at least one of a plurality of subscriber receiving stations coupled to the local distribution system; and

decompressing the compressed, digitized data representing the at least one item of audio/video information after the transmission step wherein the decompressing step is performed in the local distribution system to produce the representation of the at least one item for transmission to the at least one subscriber station;

wherein the transmitting step comprises:

inputting an item having information into the transmission system;

assigning a unique identification code to the item having information;

formatting the item having information as a sequence of addressable data blocks;

compressing the formatted and sequenced data blocks;

storing, as a file, the compressed, formatted, and sequenced data blocks with the assigned unique identification code; and

sending at least a portion of the file at the non-real time rate to the local distribution system.

15. A method as recited in claim **14**, wherein the inputting step comprises inputting the item having information as blocks of digital data.

16. A method as recited in claim **14**, wherein the inputting step comprises: inputting the item having information as an analog signal; and converting the analog signal to blocks of digital data.

17. A method of distributing audio/video information comprising:

formatting items of audio/video information as compressed digitized data at a central processing location;

transmitting compressed, digitized data representing a complete copy of at least one item of audio/video information from the central processing location;

receiving the transmitted compressed, digitized data representing a complete copy of the at least one item of audio/video information, at a local distribution system;

storing the received compressed, digitized data representing the complete copy of the at least one item at a local distribution system; and

using the stored compressed, digitized data to transmit a representation of the at least one item to at a plurality of subscriber receiving stations coupled to the local distribution system;

wherein the formatting step comprises:

inputting an item having information into the transmission system;

assigning a unique identification code to the item having information;

formatting the item having information as a sequence of addressable data blocks; and

compressing the formatted and sequenced data blocks.

18. A method as recited in claim **17**, wherein the inputting step comprises inputting the item having information as blocks of digital data.

19. A method as recited in claim **17**, wherein the inputting step comprises:

inputting the item having information as an analog signal and converting the analog signal to blocks of digital data.

* * * * *